been made would warrant an opinion, there is evidently nothing cancerous in its structure; it is a fibroid epigenesis, as simple and innocent in structure as any common dermic hypertrophy. Nevertheless, it sustains relations to the constitution and economy which are as constant and deep as those of the most malignant cancerous diseases. It is not only hereditary, but, as the case I have related shows, tends to reappear in the offspring in exactly the same locality, and when removed, "root and branch," the wound produced by the operation only serves as the bed for its wider and larger growth.

In cancer, we have a morbid product, which is wholly heterogeneous to the constituents of the healthy economy; the same is true of tubercle. The relations of both these diseases, which have no analogues, are constitutional, and therefore hereditary. We have seen the relations of cheloidea to be precisely the same in a physiological point of view; indeed, this affection, when carefully studied, seems to introduce a new feature in our views of physiological pathology. There can now be no doubt about the distinct and peculiar histological components of cancer; but if there are other growths, which are simply homologous, and are structurally of as innocent a character as the most ordinary cutaneous formations, we may well be led to ask if the practical malignancy of a morbid growth does not lie deeper than the field of exploration of chemistry or microscopy.

ART. VII.—*Cases of Lead Poisoning.* By E. A. ANDERSON, A. M., M. D., of Wilmington, N. C. Formerly Resident-Physician and Surgeon to the Philadelphia Hospital.

CASE I.—Henry Schemmerhorn, house-painter, aged thirty-seven years; habits very dissipated and intemperate; has been engaged in painting for the last fifteen years. On the night of the 27th of March, 1853, I was called in great haste, and on approaching his house heard the cries fully a square off of the patient. Found him labouring under constant and severe griping pains in the abdomen, attended with but little tenderness and no fulness; frequent eructations and vomiting; violent spasms; obstinate costiveness; great gloom and dejection of mind; pulse very slightly if at all disturbed; skin cool; tongue moist and natural, and very little if any thirst. Abdomen in the umbilical region retracted to the spine; pain not increased by pressure. Countenance haggard; eyes wild and rolling. Intervals of comparative ease are followed by such intense paroxysms of pain that the patient loses all self-control; shrieks violently, and cries like a child. Judging from Schemmerhorn's intemperate habits, I at first suspected him of suffering from the abuse of spirituous liquors, especially as there was some inability to extend the hand, or open the fingers from want of power or control over the muscles of the wrist. In addition, his gait is weak and tottering from laxity of the knee and ankle-joints, when he is ordered to stand up during the respite from pain. Close cross-examination, however, of himself and wife, elicited the fact that he had drank nothing for upwards of two weeks or more, being confined for that time to the house with symptoms, more or less severe, of colic, which gradually increased in frequency and severity, notwithstanding the use of various domestic remedies. Upon opening the mouth of Schemmerhorn, to examine his tongue, I was struck with a dark blue line around the teeth and gums both of the upper and lower jaw, so characteristic of lead-poisoning, and laid down by Tanquerel as an unerring sign of this affection. Taken in connection with the occupation of the patient, this strong diagnostic mark shows the nature of the case in the clearest possible manner, leaving no doubt either of its character or treatment. The indications here are very evident—first, to allay the severe spasmodic and neuralgic pains; secondly, to bring on free action of the intestinal tube; and thirdly, to remove the lead by which the whole system is thus thoroughly impregnated. Ordered one-fourth of a grain of sulphate of morphia in solution every quarter of an hour until the patient is relieved. ℞. Morphiæ sulphas grs. ij; aqua ℥i. Take a teaspoonful every quarter of an hour. After taking eight doses, or two grains of morphia, the pains and spasms ceased; an enema of salt and water was thrown up the rectum, and repeated three times before an operation was induced. The patient was then allowed to rest, and, as it was near midnight, I took leave, ordering ol. ricini ʒi; tinct. opii gtt. xx, to be taken early in the morning.

March 28, 1853. Upon visiting patient this morning, found the oil had operated finely, and that he is comparatively free from pain, suffering only from great prostration and soreness of the bowels. Ordered to fulfil the third indication, viz. the removal of the lead from the system. ℞. Potassæ hydriod. ʒij and ℈ij; aquæ ℥iv. Take a teaspoonful four times a day, and continue as long as the gums around the teeth indicate any decided blue tinge; if the pain returns, take, in addition, one-eighth of a grain of morphia in each dose until it subsides.

Schemmerhorn rapidly improved under this course of treatment, with but occasional returns of colic—this was kept down by the morphia, aided by large doses of castor-oil to keep the bowels open, carefully abstaining from painting for one or two weeks. At the end of this period, necessity compelled a return to his trade, and the blue line around his gums having, in a great degree, faded away, he was allowed to resume the occupation of house-painter. He is ordered the use daily at dinner of the sulphuric acid lemonade. This is given according to the directions of the French writers, who suppose that an insoluble sulphate of lead is thus formed, decomposing the carbonate and preventing farther attacks. Since then Schemmerhorn has had no recurrence of lead colic, and, up to this time, enjoys his usual health.

CASE II.—Mercury Davis, for the last twenty years house-painter, aged forty-two years. Patient complains of obstinate constipation, frequent vomiting, severe paroxysms of pain, great weakness in the legs, particularly in the knee-joints, drooping of the wrists, great languor and lassitude, gloom of mind, eyes slightly jaundiced, pulse nearly normal, and skin of natural temperature. Upon opening his mouth, a distinct dark blue line is perceived on the gums, and around the incisor teeth of both upper and lower jaws. Has been subject for some time back to constipation and abdominal pains, with frequent attacks of nausea and vomiting. His symptoms not being so severe as Schemmerhorn's, in case No. 1, I did not think it necessary to press the opiates so rapidly, having more time to manage this attack. Ordered mass hydrarg. grs. x; sulphate of morphia grs. ¼ every third hour until the pain is relieved or bowels moved.

April 6, 1853. *Evening.*—Found patient comparatively relieved of pain; vomiting ceased, but no operation of bowels; has taken four pills or one grain of morphia and forty of blue mass. Ordered ol. ricini ℥i to be taken at once, and, if the bowels are not moved by the following morning, give a purgative enema; suspend pills of morphia and blue mass.

8th. Upon visiting Davis, found that the oil had produced one large operation of hard clay-coloured scybalæ, and that he was quite comfortable except feeling great soreness in the bowels upon motion. Ordered five grains of hydriodate of potassa and one-eighth of a grain of sulphate of morphia four times a day as long as any soreness of the bowels remains.

9th. Patient quite comfortable; no operation since morning of 8th. Ordered magnesiæ sulphas ℥i, statim sumendus, which operated well on evening of same day.

10th. Patient quite comfortable; bluish line fading somewhat around the gums. Continue hydriodate of potassa grs. v four times a day as long as the discoloration remains, with occasional doses of morphia in case of recurrence of pain, and sulphate of magnesia to open the bowels if they should be again locked up. Under this treatment, Mercury entirely regained the use of his arms and legs, and the characteristic blue line around his gums was rapidly fading, when I lost sight of this case, strictly ordering him to change his occupation. Necessity, however, compelled him to resume it, and he has suffered from several similar attacks, each relieved with greater difficulty until he is now, at the present time, suffering from general anasarca, ascites, and breaking down of the entire constitution; health utterly ruined by repeated attacks of lead-disease.

CASE III.—George Williams, aged thirty-four years, engineer of Point Peter Steam Saw-mill; habits good and temperate; previous general health good. This patient was taken a week before I was called in, and treated by Mr. Keith, the proprietor of the mill, for what he supposed to be an attack of ordinary simple colic. Injections, ol. ricini, sulphate of magnesia, and tinct. opii, with blisters to the abdomen were ineffectually employed. He was then sent over the river to me, and, on visiting him, found he was complaining of constant vomiting, frequent and severe paroxysms of pain in the umbilical region, a deep-settled gloominess of mind, great despondency and obstinate costiveness, having had no operation by the bowels for more than a week. Having been very much engaged, I had, in a measure, forgotten the cases of the two painters above, and as I had no suspicion of the presence of lead in George's attack, was not struck with its great similarity to Schemmerhorn's and Mercury's. I supposed it to be a case of simple colonitis, or obstruction, either mechanical or spasmodic, of the intestinal tube.

May 1. Patient was ordered tinctura hyosciami, vin. sem. colchici, āā ℥i. Take a teaspoonful every hour until pain is relieved or bowels moved. Warm fomentations to the abdomen, and injections at sundown.

2d. Medicines had operated well; patient much easier and more composed; is able to answer questions in a satisfactory and collected manner, and can give a full account of his attack and previous state of health, which he could not do on former visits. Found upon inquiry that he was not subject to attacks of colic previous to being employed at Point Peter Steam Saw-mill; but that for the last few weeks he has been suffering from occasional cramps, costiveness, and abdominal pains, with great weakness of the wrists, ankle, and knee-joints, since taking charge of the engine at Point Peter Mill. Suspend colchicum and take tincture of hyoscyamus ʒj four times a day. Moderate exercise in the open air.

4th. George has now returned to his post, and complains only of great debility and weakness of lower extremities and wrist-joints—despondency of mind still remains. Ordered tinct. ferri muriat. as a general tonic, gtts. xx ter die. He gradually improved, and, for the present, I lost sight of this case, still entertaining no suspicion of lead-colic, *which we shall see in the sequel was clearly the nature of the disease.*

CASE IV.—David Grant, aged thirty-six years, fireman at Point Peter Mill. This patient came to me on the same day that George was discharged, viz. May 4, 1853. He was then suffering under constant vomiting, severe abdominal pains, obstinate costiveness, languid look and wo-begone countenance. Upon examining his mouth, I was struck with the characteristic blue line around the gums of the upper and lower incisor teeth, more strongly marked than in any case I have ever seen. It presented the appearance as if the entire gums had been painted with lead-coloured paint, very thickly laid on with a camel-hair brush. This was an unequivocal case of lead-colic, as we shall see most conclusively at the close of this article. To avoid useless repetition, I will here state that David was treated by injections, blue mass, and morphia, until the pain was relieved and bowels moved, followed by five-grain doses of iodide of potassa four times a day until the blue line of gums had disappeared. It is gratifying to see how rapidly this takes place under the use of the hydriodate of potassa, and I do not consider any patient safe until the natural healthy colour of the gums returns. In about a week, this patient resumed his work, and up to this time has had no return of his disease.

CASE V.—*10th.* While attending David, I was hastily summoned again to George Williams, the engineer, who had a second attack similar to the first (as in Case III.), but more violent in degree. He presented all the symptoms of poisoning by lead, and on examining his gums, the dark blue shading was almost as strongly marked as in David's case.

George was treated by injections, calomel and opium in large doses, followed by ol. ricini and hydriodate of potassa. Strict orders were also given, both to him and to David, to use no water but what they carried over in jugs themselves, from the Wilmington side of the river, until I had an opportunity of analyzing the water furnished by the proprietors to their operatives. George recovered in a week and has had no return of his complaint, although his case and David's were the two most violent I met with at Point Peter Mill.

CASE VI.—*May* 12, 1853. Samuel Meares, labourer at Point Peter Mill, came to my office on the 12th of May, 1853, with a very bad contused wound of the second and third phalanges of the forefinger of the left hand, caused by being caught between a heavy stick of timber and the flow of the mill-slide. While dressing his finger, he complained of severe abdominal pains, frequent vomiting, and obstinate costiveness. His gums presented the bluish line around the teeth very strongly marked, with the other assemblage of symptoms usual in lead-poisoning. This case proved a very severe one, but eventually yielded to the treatment made use of as above. Ordered to drink no water but what was procured by himself.

CASE VII.—*May* 13, 1853. Collins Gause, aged forty years, slide hand or out-door labourer at Point Peter Mill, was taken with all the usual assemblage of symptoms marking poisoning by lead. Upon examining his gums, Tanquerel's blue line was very strongly defined. Treated as above, with a similar successful result.

CASE VIII.—*May* 14, 1853. Henry ——, labourer at Point Peter Mill, aged thirty-five years. This case was a much slighter one than any of the preceding. It presented the usual symptoms of lead-poisoning with the bluish discoloration of the gums witnessed in the others. It yielded readily to ol. ricini and tinct. opii., followed by iodide of potassa and morphia.

CASE IX.—*May* 14, 1853. Jacob Howard, aged twenty-five years, slide hand at Point Peter Steam Saw-mill. This was a very severe case with the blue deposit on the gums strongly marked, and all the other symptoms of lead-poisoning. It required one-fourth of a grain of sulphate of morphia and ten grains of mass hydrarg. every hour, for six hours, before relief was experienced. Cathartics of sulphate of magnesia, and injections to unlock the bowels, with hydriodate of potassa to remove the lead-deposit, completed the general treatment. It terminated like the others, successfully.

CASE X.—*May* 15, 1853. Mary ——, cook to the labourers of the mill. Attack slight, with a very distinct blue tinge around the gums. It yielded to five grains of blue mass and a quarter of a grain of sulphate of morphia every third hour, followed by cathartics of sulphate of magnesia.

CASE XI.—*May* 20, 1853. Mr. Spooner, superintendent of the saws at Point Peter Steam Saw-mill, a man of very correct and temperate habits. He has been residing at the mill for the last six months or more. Came to consult me for constant abdominal pains, obstinate costiveness, nausea and vomiting. Upon examining his gums, the blue line was distinctly visible around his teeth. He was treated as above with a similar successful result.

CASE XII.—*May* 26, 1853. Jim Howard, labourer on the slide at Point Peter Mill. This patient came under treatment for a severe cold and intermittent fever, but complained, in addition, of nausea, constipation, and pains in the epigastric region. Tanquerel's blue line is very distinctly marked on his gums. His primary disease yielded to cough mixture and the sulphate of quinia, and the colica rachialgia to anodynes, opiates, and cathartics. This case was a mild one, and is only introduced to show how very extensively this complaint spread among a body of some twenty labourers, involving fully one-half of the entire force, and, for a time, almost suspending the operations at this mill, which is among the largest in the whole Southern country.

Mr. Groves, the general superintendent of the mill, and Mr. Keith, the proprietor, had both frequently complained of constipation and abdominal pains for some time previously, without suspecting the cause, and had experienced more or less relief by the use of various domestic remedies, such as pill hydrarg., paregoric, ol. ricini, &c. Upon examining their gums, a distinct trace of lead was visible. Living, as they do, on the Wilmington side of the river, and remaining on the Point only during business hours, they drank less water than the other operatives, and, of course, were but slightly affected. They have all enjoyed much better health since they have discontinued the use of the water formerly used at this establishment.

The Cape Fear River, at the town of Wilmington, N. C., divides into two branches called respectively the North-west and North-eastern Rivers. The long narrow point formed by these two rivers is known by the name of Point Peter, and is composed entirely of alluvial soil, being a mere marsh, elevated just above high-water mark, and is occasionally covered by the freshets of these two rivers. On the verge of Point Peter, which is here some 200 or

250 feet wide, is situated the Steam Saw-mill of Messrs. Nelson and Keith. On the western side of the north-east river, directly opposite to the mill, is the depot and steamboat wharf of the great Northern and Southern Railroad, which connects the waters of the Chesapeake Bay at Norfolk, Va., and of the Cape Fear at Wilmington, N. C., or the great route between New York City and Charleston, S. C. The sand-bluff here rises forty feet or more above the river, and as the railroad pursues for the first part of its course a direction nearly east, or at right angles to the river before making its great curve to the north, it bisects or splits in two this sand-bluff or elevated table-land. Along the line of this deep excavation, several springs of pure water are opened and collected into one reservoir, from which it is carried through a five-inch cast-iron pipe to a large cistern some five hundred feet from the river-bank at an elevation of about twenty feet from its surface. This water is perfectly pure, being free from any trace of lime, saline, or mineral substances, and is exactly in the condition laid down by Christison as most exposed to the risk of dangerous impregnation from lead—for the more pure the water, the greater the risk—since the saline and earthy waters deposit or line the inside of the lead-tubing with an insoluble crust or coating, which pure water fails to do; but takes up and holds in solution the poisonous particles of lead, ready to act with its deleterious properties upon those who, unfortunately, use it through ignorance of this chemical law.

During the fall of 1852, the workmen at Point Peter Mill suffered much from repeated attacks of dysentery, supposed to be produced by drinking the river-water. At this season of the year, the Cape Fear is very low, leaving its banks uncovered, and a very large extent of swamp and boggy marshes, filled partially with stagnant pools slowly running into the river, which, consequently, brings down past the mill-site much decayed vegetable matter and slime in solution. Fresh spring-water is carried across the river in casks for the use of the operatives, but, becoming warm, is not generally used—the temptation to drink the river-water, which is much cooler, overcoming the dictates of prudence.

The proprietors of the mill, hence, were induced to carry the pure spring-water from the reservoir above-named on the sand-bluff opposite to Point Peter, across the river to the mill, and, unfortunately, made use of lead-pipe for this purpose. The spring-water is conducted from the reservoir on the side of the sand-bluff or hill through a three-inch lead-pipe some five hundred feet to the margin of the river. Here it is taken by another lead-pipe, one-inch bore, which dips down, following and resting upon the bottom of the river over to the Point; this pipe is fifteen hundred feet long, making, with the large tube, *two thousand* feet in all, which conducts it into a large cistern on the wharf of Point Peter. This water has been used very freely by all the operatives at the mill.

For the first three or four months, with the exception of occasional neuralgic pains, simulating colic, general languor, and malaise, no prominent symptoms of lead-affections occurred. This, however, is not at all surprising, if we consider that, in the first place, the majority of patients do not suffer from lead-colic for a number of years, since lead is a cumulative poison, the introduction of very minute portions of which into the system ultimately produces effects that may not show themselves at first. Secondly, that as the winter of 1852–53 followed shortly after the introduction of the lead-pipe, a far smaller quantity of water was made use of than in the heats of summer, when the thermometer often rises to 120° in the sun. And we find that the most severe cases occurred precisely among those workmen, who, being most exposed to the heat of the engine and furnaces, drank very freely of this water. That the next most severe class of cases were among the out-door or slide hands, who were exposed to the full action of a southern sun. The labourers who worked in the shade under cover of the mill, were less heated, used comparatively but little water, consequently imbibed but a minute portion of lead, and of course suffered least of any.

The two superintendents of the mill, viz. Groves and Spooner, who were not expected to perform manual labour, of course suffered less in proportion; for they were not heated by excessive exercise or labour in the sun, and drank, necessarily, but little water.

Mr. Keith, the proprietor, resides constantly on the Wilmington side of the river, and used the lead-water at only occasional intervals, and was of ,course but slightly affected.

The above ten cases, occurring in one locality, characterized by a great similarity of symptoms; presenting, as they did, severe abdominal pains, constant vomiting, obstinate constipation, no fever, great gloominess of mind, languid look and wo-begone countenance, with the *blue line around the gums and teeth*, the most unerring symptom of all, could leave no doubt of the character of the complaint, especially if we consider the great length of pipe, viz. two thousand feet, through which the water is carried. They all yielded to the same general course of treatment which we have found in our experience to succeed best, viz.: iodide of potassa, morphia, injections, colchicum, hyoscyamus, mass hydrarg., blisters, opium, ol. ricini, and calomel. In a word, allay the pain with narcotics and anodynes; aided, if necessary, by blisters, followed up by enemas and cathartics, and the free subsequent use of the iodides.

But one link was wanting in this chain of evidence, viz. the presence of lead in this water, and this we were enabled to detect most satisfactorily. Two vessels were filled, one with perfectly pure water and the other with water furnished us by Mr. Keith, from Point Peter cistern. Iodide of potassa being placed in the one, the colour was unaltered; but in the other, an orange-coloured tint was at once perceived, showing the formation of iodide of lead by precipitation. A second set of vessels were similarly filled; through both a stream of sulphuretted hydrogen gas was passed; no action on the pure water: but in the suspected liquid, a copious dark brown precipitate was thrown down, exhibiting sulphuret of lead, which collected in perceptible portions at the bottom of the glass.

Since Mr. Keith has discontinued the use of this water, all cases of colic have disappeared among the workmen; for we see that ten out of twenty workmen were attacked in rapid succession, almost suspending the operations of the mill during the most active and profitable season of the year. Water is now carried over in casks, and no loss of labour is experienced.

The proprietors of Point Peter Mill have concluded to abandon the use of the lead-pipe, and either use the gutta percha in its place, or sink an artesian well. From the earliest use of the lead-pipe up to the present time, its poisonous properties have been prominently brought before the public; but such is the economy, flexibility, and convenience of this style of pipe, that but little impression against its use has hitherto been made. In the hope that these statements may lead to investigation, and arouse to a sense of danger, thus constantly incurred, I have reported these cases to your widely extended journal, if you deem them of sufficient interest to merit an insertion.

ART. VIII.—*Crystals of Urate of Potash in Urine.* By BENJAMIN S. SHAW, M. D., of Boston. (With wood-cuts.)

ON examining an urinary deposit, I found crystals of urate of potash. This substance rarely has a crystalline form in urine, generally being deposited amorphous. In this instance, these crystals were in the form of flat needles, with well-marked terminal faces, transparent and colourless. Many of them were collected in groups around a common centre, forming rosettes. When dissolved in nitric acid, and treated with ammonia, they gave the usual indications of uric acid, viz., a purple colour. Dissolved in nitric acid and treated with chloride of platinum for potash, yellowish octohedra of chloride of platinum and potash, not polarizing light, were formed.

The deposit was flocculent, and of a light-pink colour; no other abnormal ingredient was found in the urine, except a small quantity of the ammonia-magnesian phosphate, and a very few torulæ, which were probably of accidental occurrence.

The patient from whom the urine came was a young man who had complained of general debility and loss of appetite, without any well-marked symptoms of any disease, for several weeks.

This form of urate of potash can be artificially obtained by the union of uric acid and potash in large quantities, and crystallization from hot water.